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EFFECT OF THE REGIONS OF THE TISZA VALLEY ON THE MALACO-FAUNA

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Summary

Author, based on earlier investigations, establishes correlations between the snail-fauna of the vegetation of the river bank succession and the water basins. 1. The rivers has a role in the development of the snail-fauna transporting living individuals from their water basins (BÁBA 1979 b.). 2. On the basis of mathematical evaluation of different groups established on humuditiy demands it can be proved that the snail-fauna of the plain can be differentiated according to the flora grouping (BÁBA 1979a). 3. New zoogeographical grouping of the terrestrial species made it possible to make a mathemathical-distributional investigation of the river bank faunas and to interprete the results on the basis of the data about stream densities established by ANDÓ (1972) (Figs. 1. and 2).

On the graph of Figure 2. the regions of the Great Hungarian Plain are divided into three parts; no identity is shown between the Dráva Plain and the Danube Plain and between these and the regions of the Tisza Plain.

Between the smaller regions of the Tisza Plain correlation was established on a significancy level of 10 per cent (this value was used for balancing fauna-deformations due to civilizational effects). From the composition of the regions on the left side and on the right side of the Tisza emerges that the rivers rising from the Northern Carpathians (mountains poor in endemisms, Soós 1943) give no individuality to the regions they travers. The Körös—Maros region has an other fauna. This is in accordance with the facts published by ANDÓ (1972): the leftside tributaries of the Tisza rise from two separate water basins characterized by different hydrographical and hydrodynamical properties. This could be proved by zoogeographical statistical analysis.

It can be established that the terrestrial snail-fauna of the physical-geographical regions of the Great Hungarian Plain is influenced by climate, forest thickness, soil factors and by differences of water basins of the rivers and inside this water quantity and stream density of the regions. The actual fauna is determined by these factors.

Introduction

Analysing the fauna in the deposits of the river Tisza and its tributaries (BÁBA 1979b) and even more so investigating the effect of the climate types discernible on the Great Hungarian Plain (KAKAS 1960) it was established that stocking of the different regions with snails depends on the rivers which come from different directions from the mountains (BÁBA 1979a).

Apart from the biotic and climatic factors which manifest themselves through the soils and apart from the abiotic orographic factors the effects of the rivers must be considered when the snail-fauna of the Great Hungarian Plain and inside this the Tisza Plain (PÉCSI 1969) is analysed.

Methods

Snails collected from different plant associations were grouped according to the physical-geographic regions established by SOMOGYI (1961). In the different regions only the snails of the vegetation of the mineralogeneous successions were considered because only these are directly connected with the rivers. These plant associations are the willow groves, willowpoplar groves, elm-oak-ash groves and hornbeak-oak groves (*Salicetum triandrae* MALCUIT, *Salicetum albae-fragilis* ISSLER, FRAXINO P.—ULMETUM PANNONICUM SOÓ, *Querco roboris — Carpinetum hungaricum* SOÓ) (SOÓ 1964). It is to be noted that the occurrence of these associations is very variable along the different rivers, especially in the regions Jászság, Sajó-Hernád-köz (other name: inundation areas of Heves and Borsod), Taktaköz, and Hortobágy are poor in these associations due to intensive agriculture and forestry (cultural influences).

The effect of rivers manifest itself in number of species and individuals, in quality of species and in frequency of species. Differences in the snail-fauna between the different regions were established by three ways. Differences in species composition of the regions were investigated to establish wether from the different river basins different species are coming and wether in the number and in the frequency of species differences could be observed (BÁBA 1981a, 1981b). It was also investigated wether there is identity between the fauna-composition of the Duna—Tisza Plain and the Dráva Plain Latter problem was investigated with mathematical methods. Zoogeographically the observed snail species can be ordered into 10 fauna-groups. Considering also the sub-groups 18 units can be distinguished (distribution according to BÁBA 1980). Empirical frequency distribution test with more than two classes and χ^2-test were applied in comparing distribution of fauna-groups in the regions. Altogether 13 physico-geographical regions were investigated: 1. Dráva Plain, 2. Danube Plain, 3. Danube—Tisza Plain, 4. Lower reach of Tisza, 5. Middle-Tisza reach, 6. Hortobágy, 7. Sajó—Hernád-köz, 8. Taktaköz, 9. Körös region, 10. Körös—Maros region, 11. Nyírség, 12. Szatmár—Bereg Plain including Bodrogköz (=Northern Plain), 13. Temesköz (Rumania).

Fig. 1. Comparison with more than two classes (x^2 test) of frequency distribution between the zoogeographical categories of the regions of the Great Hungarian Plain

	1	2	3	4	5	6	7	8	9	10	11	12	13
01	5	14	14	6	7	10	4	3	12	6	12	19	20
02	0	0	1	0	0	1	0	0	1	1	0	0	1
03	2	1	2	1	0	0	2	0	1	2	2	3	2
041	1	1	0	0	0	0	0	0	0	0	0	0	0
042	1	1	1	1	0	1	2	0	0	1	1	2	2
043	1	0	2	1	0	1	1	0	0	1	1	3	2
044	3	3	0	0	0	0	1	0	0	1	1	1	4
05	2	2	2	0	0	0	0	0	0	2	0	1	4
06	2	1	0	0	0	0	0	0	0	1	1	1	1
07	5	1	4	1	1	1	0	0	1	1	4	6	9
081	0	0	0	0	0	0	0	0	0	0	0	0	1
082	0	0	0	0	0	0	1	0	0	0	0	1	1
083	1	0	0	0	0	0	0	0	0	0	0	1	1
084	0	0	1	0	0	0	0	0	0	0	0	0	0
085	0	0	0	0	0	0	1	0	0	2	1	0	2
09	1	1	0	0	0	0	0	0	0	0	0	0	0
010	0	1	0	0	0	0	0	0	0	0	0	0	0
Σ =	24	26	27	10	8	14	12	3	15	18	23	38	50

Differences of the regions

Investigation of the differences of the regions based on their snail-fauna is possible because definite differences could be established in the species composition and in the quantitative aspect of the sediment-faunas (BÁBA 1979b). Analysing the sediment-faunas it can be established that these faunas can be differentiated by their qualitative and quantitative composition due to differences in the macro-climate and micro-climate of their water basins.

The rivers transport not only dead but also living individuals. The greater the rise and fall and the quantity of the water the more is the number of species and the number of individuals which are transported.

Qualitatively the Northern Plain differs in four species *Hygromia trassylvanica* (WEST.), *Perforatella dibotrion* (M. KIM.), *Lehmania marginata* (O.F.M.), *Helicogona banatica* (RM.) (differential species as compared with Nyírség). In the Nyírség the 6 differential species are partly accidental as *Bielzia coerulans* (M. BIELZ), partly extinct *Acicula polita* (HARTM.), *Discus rotundatus* (O.F.M.), *Ruthenica filograna* (RM.) (Soós 1915) and *Truncatellina claustralis* (GREDL.) still has been found (VÁGVÖLGYI 1953) and the rediscovered *Pomatias rivulare* (EICHW.). Common species of the two regions are *Clausilis pumila* C. PFEIFF, *Perforatella vicina* (RM.) and *Helix lutescens* RM. On the inundation area of Sajó—Heves occur two species characteristic to the Eastern-Carpates and to the dacic-podolic regions respectively: Perforatella vicina and *Hygromia transsylvanica*. On the Kőrös-region only *Helix lutescens* and *Oxychilus hydatinus* (RM.), on the Körös—Maros region *Hygromia kovacsi* PINTÉR et VARGA, on the Rumianian parts *Helicogona banatica* and *Deroceras reticulatum* (O.F.M.), on the Danube—Tisza region at the border of the Gödöllő hill-country *Deroceras reticulatum* and *Ena obscura* (O.F.M.), on the Hortobágy the recently found "accidental" element *Laciniaria plicata* (DRAP.) (PINTÉR and SZIGETHY 1980) are the differential elements as contrasted to the other regions. On the Dráva Plain and the Duna Plain live three species characteristic also to the alpine water basin: *Aegopinella ressmanni* (WEST.), *Helicogona arbustorum* (L.), and *Cepaea nemoralis* (L.). In contrast to this live only on the Danube Plain (inundation area of the Danube and on the plain of Solt) as accidental elements *Aegopinella pura* (ALD.) and *Trichia unidentata* (DRAP.). The differential elements of Dráva Plain and Danube Plain are only locally settled as *Daudebardia rufa* (DRAP.), *Perforatella bidentata* (GM.), *Helicogona planospira* (LAM.), and *Cepaea hortensis* (O.F.M.).

This differences between the regions are much more expressed when quantitative differences are considered. Species collected with the aid od the square method are valuated by a 1—5 scale (1—60=1; 61—120=2; 121—180=3; 181—240=4; 241— =5). As an example 18 frequent species are given:

Numbers in the head-piece mean: 1. Dráva Plain, 2. Danube Plain, 3. Danube—Tisza region, 4. Trans-Tisza region: Sajó—Hernád region, Taktaköz, Hortobágy, Körös region, Körös—Maros region, Lower Tisza, Temesköz, 5. Nyírség (until Szatmár in Rumania), 6. Bodrogköz with the Szatmár—Bereg plain.

On the basis of quantity of occurrence the regions can be well separated. In the different regions different species are predominant. In the case of common species they occur in different frequencies. Based on this, the 13 middle and small regions (according to SOMOGYI 1961) can be reduced to 6 higher units (BÁBA 1979a, see Table). These 6 higher units correspond to the flora groups of Soó (1964): Titelicum, Colocense, Praematrium, Crisicum, Nyírségense, Samicum. This is caused not only by the differences in climate and forest types but also by the differences in the density of streams.

Density of streams is 0.1—0.2 km km^{-2} on the Danube—Tisza Plain, nn the Lower-Tisza Plain, and on the greater part of Crisicum (the immediate vicinity of Körös excluded). *Helicella obvia* and *Cepaea vindobonensis* living on dryer places has a frequency value parallel with the lower density of streams. Nyírség and the Northern Plain has a stream density of 0.3—0.5 km km^{-2} (ANDÓ 1972).

Comparison of the regions gets an other meaning when they are compared on the basis of the distribution frequency of zoogeographical categories in the plant associations occuring on the river banks, on places directly influenced by the rivers. This grouping, taking into consideration the transport by the rivers, shows more expressed the differences of the snail-fauna remaining and settling down on the inundation areas due to the different water basins (Fig. 1. and 2).

P= 13		12	11	10	9	8	7	6	5	4	3	2	1
1	70	50	50	70	10	70	50	30	30	70	30	50	
2	70	50	70	70	70	99	50	70	90	70	50		
3	90	90	70	70	70	95	30	90	90	95			
4	97,5	99	95	90	70	90	70	90	70				
5	90	90	90	50	90	70	30	90					
6	90	90	70	50	70	90	30						
7	70	50	50	90	30	70							
8	99	97,5	95	90	90								
9	70	70	70	50									
10	90	50	70										
11	95	95											
12	90												
13													

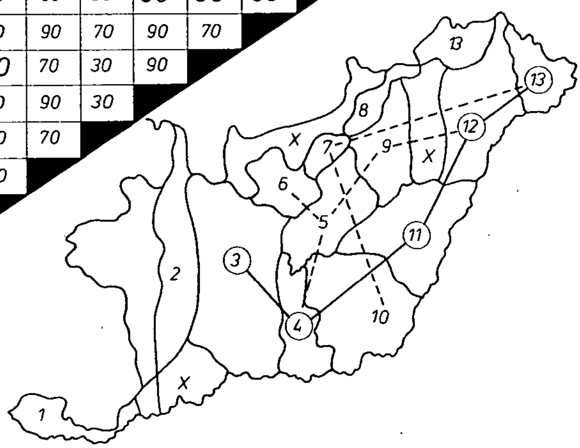

Fig. 2.
Result of chi² probes, significancy level: P=, and the graf of significant in each area similarities

On the map of Figure 2. the results are represented with the aid of a graph. Choosing a 10 per cent significancy level to balance deformations due to cultural effects, the Great Hungarian Plain can be divised into three parts: the Dráva Plain and the Danube Plain showing no identity with each other nor with the regions of the Tisza Plain (PÉCSI 1969). In contrast to this the smaller regions of the Tisza Plain show, however, only a low affinity between themselves characterized by 5—10 per cent. On the basis of these affinities two interesting facts can be considered.

First, the regions on the right bank of the Tisza show connections with the left bank regions. This means that the snail-fauna of these inundation areas are only slightly influenced by the rivers with low water quantity as the Hernád, Sajó, and Zagyva. The cause of this is that the Northern Carpates are poor in endemism (SOÓS 1943) and so individuality of these regions could notte developed.

On the other hand, the Körös—Maros region (including Temesköz) is separated from the faunas of the other left side tributaries. This can be interpreted by data published by ANDÓ (1972). He distinguishes two water basins for the left side tributaries: North-Eastern water basin (Upper-Tisza, Szamos, Kraszna, Túr, Batár, Visa, Iza, Sebes-Körös and Fekete-Körös. This water basin has a stream densitiy of 0.3—0.5 km km^{-2} and is characterized by great differences in rise and fall.) The other is the South-Eastern water basin of the rivers Kis and Nagy-Szamos, Fehér-Körös, Maros, Aranyos and the Küküllő-s with 0.5—0.6 km km^{-2} stream density but with a more steadily flow.

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A Tiszavölgy tájegységeinek hatása a malakofauna kialakulására

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Kivonat

A szerző korábbi vizsgálatainak alapján kapcsolatot mutat ki a folyók vízparti, növényzeti successió sorában található erdők csigái és a vízgyűjtőterületek közt. A korábbiakban vizsgált összefüggések alapján. 1. A folyók szerepet játszanak vízgyűjtőikből élő egyedek transzportálásával, a csigafauna kialakításában (BÁBA 1979b). 2. A fajok abundancia viszonyainak nedvességcsoportok szerinti összehasonlító matematikai vizsgálatával igazolható, hogy a csigafauna az Alföldön a növényzeti flórajárásoknak megfelelően elkülönül (BÁBA 1979a). 3. A magyarországi

szárazföldi fajok új állatföldrajzi besorolása lehetőséget adott arra, hogy a folyók vízparti faunáját tájegységek szerint matematikai eloszlásvizsgálattal összevesse s az eredményeket (1.2. ábra ANDÓ 1972 1972 vízfolyássűrűség adatai alapján értelmezze.

E szerint a folyók vízgyűjtők szerint csigafaunájuk alapján elkülönülnek a Tisza jobb és balparti folyóinak különböző vízrajzi és vízjárási tulajdonságai (Andó 1972) A csiga fauna állatföldrajzi és vízjárási megoszlásában is különbséget mutatnak a statisztikai elemzés alapján.

Uticaj deonica doline reke Tise na razvoj malakofaune

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Abstrakt

Autor na osnovu svojih ranijih istraživanja ukazuje na povezanost izmedju slivnog područja reke i faune puževa u šumama u nizu vegetacijske sukcesije priobalne zone:

1. Reke učestvuju u razvoju faune puževa transportuju i žive primerke sa slivnog područja (BÁBA, 1979b).

2. Na osnovu uporedno matematičke analize abundantnosti vrsta prema vlažnosti potvrdjuje se, da se fauna puževa Panonske nizije, adekvatno florističkim elementima, razdvaja (BÁBA 1979a).

3. Novo zoogeografsko razvrstavanje puževa Madjarske omogućio je, da se fauna priobalnih zona po rejonima uporedi matematičkom obradom i da se dobijeni rezultati tumače prema ANDÓ-u 1972 (sl. 1.2).

ВЛИЯНИЕ ПРИРОДНОГО КОМПЛЕКСА ДОЛИНЫ РЕКИ ТИСЫ НА ОБРАЗОВАНИЕ МОЧОКОФАУНЫ

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Резюме

На основании предыдущих исследований автор показывает на взаимные связи между моллюсками, живущими по берегам рек, а в сукцессивной части лесной растительности речных бассейнов. На основании совокупных исследований заключил:

1. Реки играют значительную роль в образовании фауны моллюсков посредством их индивидуального транспорта в бассейне реки (Баба 1979 б).

2. Посредством отношений абунданаций виды сравниваются по группам влажности, оправдывая их математическими исчислениями, что фауна моллюсков на Венгерской Равнине отделяется согласно флорических районов растительности (Баба 1979а).

3. Занесение венгерских наземный видов в новое зоогеографическое деление дает возможность новой оценки фауны берегов рек отдельных ландшафтов и с помощью математических исчислений сопоставите их результаты на основании обьяснения Андо 1972, касающиеся густоты воды.

Ландшафты Великой Венгерской равнины разделяются на 3 части. Равнины Дравы, Дуная и Тисы, которые между собой не являются идентичными. Отдельные, меньшие хандшафты равнины реки Тисы под влиянием культурной деятельности человека стали идентичными. Право и левобережные ландшафты р. Тисы во взаимных отношениях показывают на то, что нистекающие реки с маловодных Северных Карпат не образуют своеобразные характерные ландшафты на тех местах, по которым они протекают. (В эндемах очень бедная горная страна, Шоо, 1943)

В то же время фауна между р. Кереш и Марон имеет совершенно другое сложение. Это определялось путем анализа зоогеографической статистики.

Установлено, что на развитие фауны моллюсков в природогеографических ландшафтах Венгерской равнины (Алфелда) влияют кроме климатических, культиваций леса и почвенных условий, также разницы в водосборных территориях протекающих рек, их канохы и отношения густоты водной сети отдельных ландшафтов.